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Principal, September 2, 1886,	\$500.
Interest to September 1, 1894, 8 years less 1 day,	279.90
Interest on Interest=Interest on \$35 for 28 years less 8 days,	68.55
Amount of Principal and Interest due September 1, 1894,	\$848.45
Payments,	\$375.
Interest on \$75 from May 13, 1893, to September 1, 1894,	7.26
	\$382.26
Amount due September 1, 1894,	\$466.19
Interest for 7 months,	19.03
Amount due April 1st, 1895,	\$485.22

PROBLEMS.

56. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in Irving College, Mechanicsburg, Pennsylvania.

A, B, and C can walk at the rate of $a=3$, $b=4$, and $c=5$ miles, per hour. They start from Washington, at $m=1$, $n=2$, and $p=3$ o'clock, P. M., respectively. When B overtakes A, he is ordered (by A) back to C. When will B and C meet? Suppose B had ordered A back to C, when would A and C meet? In case all three continue walking ahead, at what time will they meet?

57. Proposed by L. B. FRAKER, Weston, Ohio.

Suppose that in a meadow the grass is of uniform quality and growth and that 6 oxen or 10 colts could eat up 3 acres of the pasture in $\frac{15}{26}$ of the time in which 10 oxen and 6 colts could eat up 8 acres; or that 600 sheep would require $2\frac{2}{7}$ weeks longer than 660 sheep to eat up 9 acres.

It what time could an ox, a colt, and a sheep together eat up an acre of the pasture on the supposition that 589 sheep eat as much in a week as 6 oxen and 11 colts? By Arithmetic, if possible.—Hunter's Arithmetic. (Unsolved in *School Visitor*.)

Solutions of these Problems should be received on or before January 1, 1896.

ALGEBRA.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

SOLUTIONS OF PROBLEMS.

48. Proposed by SETH PRATT, C. E., Assyria, Michigan.

What is the interest of \$500 for 10 years at 10 per cent. per annum, when the intervals of compounding are infinitely small?

I. Solution by Professor E. W. MORRELL, Department of Mathematics, Montpelier Seminary, Montpelier, Vermont; and BENJ. F. YANNEY, A. M., Professor of Mathematics, Mount Union College, Alliance, Ohio.

The formula for P dollars at compound interest for n years payable q times a year at rate r , is $P(1+\frac{r}{q})^{qn}$. In this case q is infinity; let $\frac{r}{q}=\frac{1}{x}$, whence $q=rx$ and the formula becomes $P(1+\frac{1}{x})^{xnr}$, but $(1+\frac{1}{x})^x=e$ at the limit and we have the amount= Pe^{nr} and the interest will be $Pe^{nr}-P$. In this case $P=500$, $e=2.718281828$, $n=10$, $r=.10$, and we have the interest= $500(2.718281828-1)=\$859.1409142$.

II. Solution by W. H. CARTER, Professor of Mathematics, Centenary College of Louisiana, Jackson, Louisiana; and JOHN M. ARNOLD, Crompton, Rhode Island.

$\frac{A}{P}=(1+\frac{r}{q})^{qn}=\frac{A}{500}=(1+\frac{1}{10q})^{10q}$. Expanding the second member, and reducing, $\frac{A}{500}=1+1+\frac{(1-\frac{1}{10q})}{2!}+\frac{(1-\frac{1}{10q})(1-\frac{2}{10q})}{3!}+\dots\dots\dots$

When the intervals are infinitely small the number of intervals (q) is infinitely large, and the fraction in each factor of the numerator of each term is zero. $\therefore \frac{A}{500}=1+1+\frac{1}{2!}+\frac{1}{3!}+\dots\dots\dots$

The sum of this series is the Napierian base. $\therefore \frac{A}{500}=2.718281828$. $\therefore A=1359.140914$, and $A-P=\$859.140914$ =interest required.

III. Solution by Professor J. SCHEFFER, Hagerstown, Maryland.

Let y be the amount, a the initial principal, r the rate per cent., and t the time in years; then, we have from $dy=\frac{rydt}{100}$, $y=Ce^{\frac{rt}{100}}$, but since for $t=0$, $y=a$, we have $C=a$. $\therefore y=ae^{\frac{rt}{100}}$, and interest= $a(e^{\frac{rt}{100}}-1)$. For $r=10$, $t=10$, we have interest= $500(e-1)=500 \times 1.718281828=\$859.140914$.

Also solved by O. W. ANTHONY, P. S. BERG, F. P. MATZ, C. D. SCHMITT, H. C. WILKES, and G. B. M. ZERR.

49. Proposed by P. S. BERG, Larimore, North Dakota.

A man having lent \$6000 at 6 per cent. interest payable quarterly, wishes to receive his interest in equal proportions monthly, and in advance. How much ought he to receive monthly?